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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/933,606	08/20/2001	Mark Timothy Sullivan	10010323-1	6749

7590 11/26/2004

AGILENT TECHNOLOGIES
Legal Department, 51U-PD
Intellectual Property Administration
P.O. Box 58043
Santa Clara, CA 95052-8043

EXAMINER	
LEE, HWA S	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 11/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/933,606	SULLIVAN ET AL.	
	Examiner	Art Unit	
	Andrew Hwa S. Lee	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 30-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 30-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remarks

This Office Action is in response to Applicant's amendment filed 9/7/02. By this amendment, claims 1, 3-5, 7, and 8 are amended, claims 10-29 have been cancelled, and claims 30-33 are newly added. Claims 1-9 and 30-33 are now pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7-9 and 30-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 7 recites in the interferometer optics clause that the *first and second beams are directed to the interferometer optics*. In contrast to that, the beam-combining clause recites the *recombined heterodyne beam is directed to the interferometer optics*. As presently claimed, it is unclear if the beams go into the interferometer optics before or after the beam combining unit. For examination purposes, it will be assumed that the beams enter the beam-combining unit and then the recombined heterodyne beam enters the interferometer optics.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 1, and 3-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US 5,793,487) in view of Takamiya (US 5,327,222).

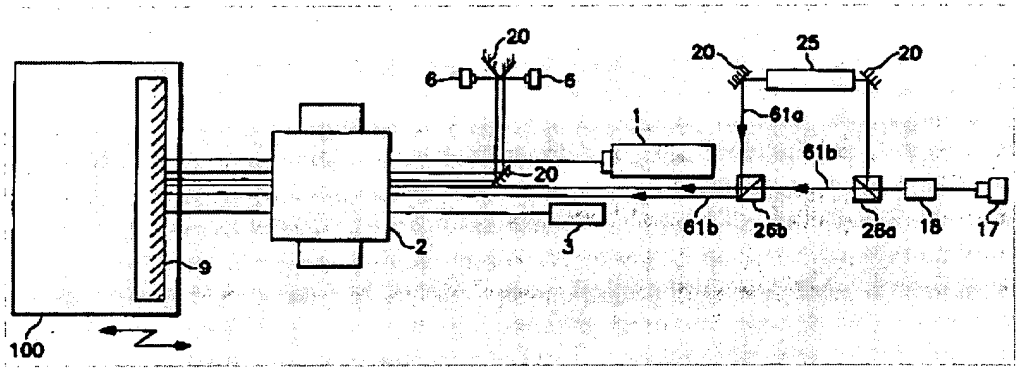
Takahashi shows an optical interferometer comprising:

a source of a heterodyne beam (17, 18) that includes a first frequency component having a first frequency and a first linear polarization and a second frequency component having a second frequency and a second linear polarization, wherein the second linear polarization is orthogonal to the first linear polarization;

a beam splitter (26a) positioned to separate the first and second frequency components of the heterodyne beam and thereby produce a first beam having the first frequency and a second beam having the second frequency ;

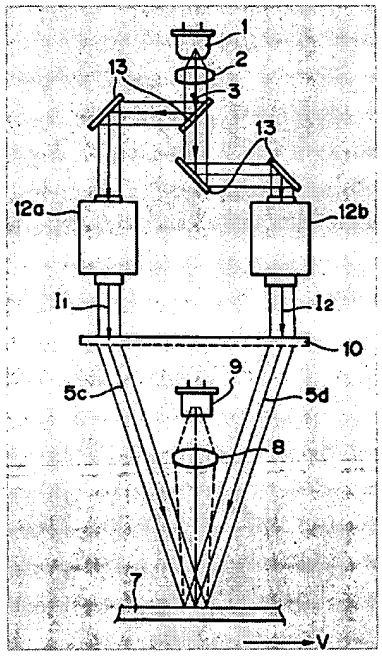
a first wavelength shifter (25) in a path of the first beam, the first wavelength shifter operating to increase a difference between the frequencies of the first and second beams; and

interferometer optics (2) that generate measurement and reference beams from the first and second beams.



Takahashi does not expressly disclose the specifics what is used as the wavelength shifter and in particular that the wavelength shifting is performed by an AOM.

Takamiya shows an interferometric displacement information detecting apparatus wherein Takamiya teaches that a wavelength shifter (12a, 12b) is an acousto optical device (AOM).



At the time of the invention, one of ordinary skill in the art would have used an AOM to shift the wavelength of the light because Takahashi specifies that wavelength is to be shifted and Takamiya teaches that an AOM is used to shift the wavelength of light, therefore one of ordinary skill in the art would have used an AOM since an AOM can shift the wavelength of light in order to meet Takahashi's requirement to shift the wavelength of the light.

With regards to **claim 3**, Takahashi shows that laser light is produced by a laser light source (17) and the acousto-optic device produces laser light of orthogonal two different

frequencies. In column 3, lines 19+, Takahashi teaches that laser light of orthogonal two different frequencies can be produced by a laser influence by Zeeman effect or by means of an acousto-optical device, thus suggesting to one of ordinary skill in the art that both means are functional equivalents. Therefore one of ordinary skill in the art would have used a laser influenced by Zeeman effect since both are functional equivalent and in order simplify the apparatus will fewer component.

With regards to **claim 4**, Takahashi shows a laser (17); and an optical element (18) in a path of the heterodyne beam between the laser and the beam splitter, wherein in the heterodyne beam exiting the optical element, the first frequency component has the first linear polarization and the second frequency component has the second linear polarization (column 6, lines 31-33).

With regards to **claim 5**, Takahashi does not expressly teach what type of beamsplitter is used for beamsplitter 26a. Takahashi however specifies that "one of the laser lights is directed to a wavelength shifter (25) for shifting the wavelength of light" suggesting to the skilled artisan that only one wavelength is wavelength shifted. Thus a beam of one frequency and polarization is directed to the wavelength shifter. The skilled artisan would recognize that a conventional amplitude dividing beamsplitter would not perform as required by Takahashi because each beam would be comprised of both frequencies and both polarizations which after one of the beams going through the wavelength shifter, the result would be a beam of orthogonal four frequencies. Takahashi shows a polarizing beamsplitter (20) that separates an orthogonally polarized beam. At the time of the invention, one of ordinary skill in the art would have used a polarizing

beamsplitter in order to separate the beam so that the combined beam from the wavelength shifter and the beam that bypassed the wavelength shifter results in an orthogonally polarized beam as required by Takahashi.

With regards to **claim 6**, Takahashi shows a beam recombining unit (26b).

2. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahshi and Takamiya as applied to claim 1 above, and further in view of Kawai et al (US 5,767,971).

Takashi and Takamiya show all the elements as shown above with respect to claim 1, but do not show a motivation for a second AOM changing the frequency of the second beam.

Kawai et al show an interferometric displacement measuring apparatus where Kawai shows an embodiment where an AOM is used only on one path and a second embodiment where an AOM is used on each separate path and teaches that both are functional equivalents (Figures 7 and 10).

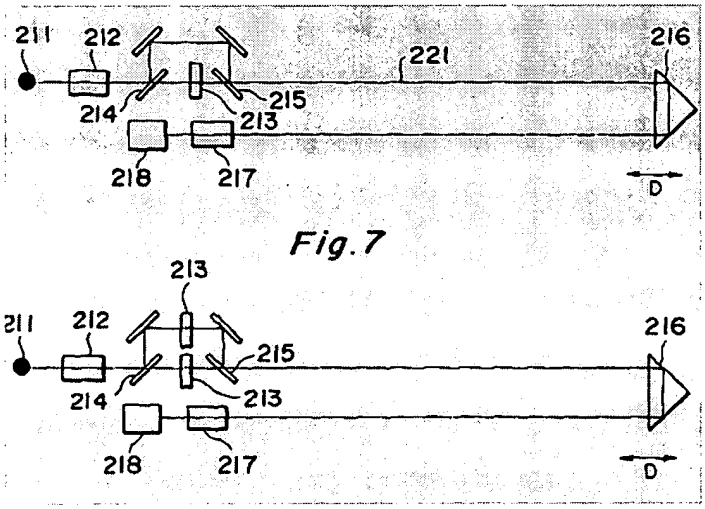


Fig. 7

At the time of the invention, one of ordinary skill in the art would have used a second AOM on the second beam because Kawai et al teaches that a single AOM on the first path is

functionally equivalent to having an AOM on each beam, and the skilled artisan would recognize that having a second AOM on the second beam would give additional flexibility in selecting the frequency of the second beam.

3. **Claims 7-9 and 31-33,** *as understood by the examiner* are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Takamiya, Fuchs et al (US 5,781,295) and Nicia et al (US 4,492,426) .

Takahashi shows an optical interferometer comprising:

a source of a heterodyne beam (17, 18);

a beam splitter (26a) positioned to split the heterodyne beam;

a first wavelength shifter (25) in a path of the first beam, the first wavelength shifter operating to increase a difference between frequencies of the first and second beams:

a beam-combining unit positioned to receive the first and second beams and provide a recombined heterodyne beam to the interferometer optics,

interferometer optics that generate measurement and reference beams from the recombined heterodyne beam.

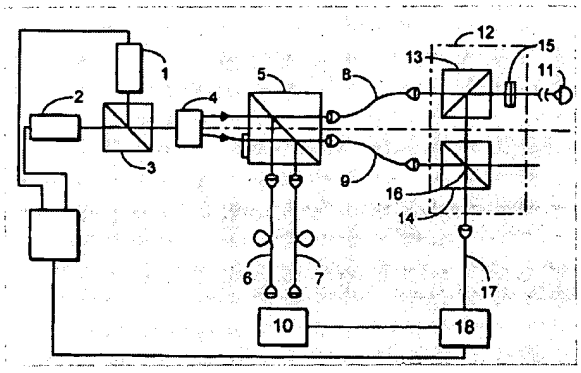
Takahashi does not expressly show the splitting of the heterodyne beam into a first beam and a second beam having different frequencies, does not expressly show that the wavelength shifter is an AOM, and does not expressly show the beam combiner as presently claimed.

With regards to Takahashi not expressly stating that the heterodyne beam is split into a first beam and a second beam having different frequencies, Takahashi however specifies that

"one of the laser lights is directed to a wavelength shifter 25 for shifting the wavelength of light" suggesting to the skilled artisan that only one wavelength is wavelength shifted, thus a beam of one frequency and polarization is directed to the wavelength shifter and the other bypasses the wavelength shifter.

With regards to Takahashi not expressly showing what is used to wavelength shift, Takamiya shows an interferometric displacement information detecting apparatus wherein Takamiya teaches that a wavelength shifter is an acousto optical device (AOM). At the time of the invention, one of ordinary skill in the art would have used an AOM to shift the wavelength of the light because Takahashi specifies that wavelength is to be shifted and Takamiya teaches that an AOM is used to shift the wavelength of light, therefore one of ordinary skill in the art would have used an AOM since an AOM can shift the wavelength of light in order to meet Takahashi's requirement to shift the wavelength of the light.

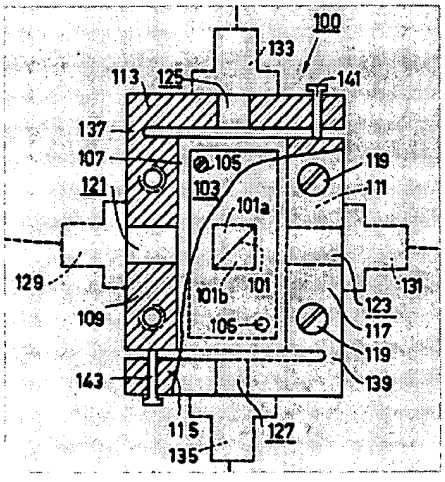
With regards to the beam combining unit, Fuchs et al show an interferometer for displacement measurement comprising a beam combiner (12,22), a first optic cable assembly (8, 20) that carries the first beam, and a second optic cable assembly (9, 21) that carries the second beam to the beam combiner but does not show a manipulator.



At the time of the invention, one of ordinary skill in the art would have used optical fibers to direct the interferometric beams in order to achieve a simple construction (column 2, lines 6+), provide beam guidance with identical beam geometry (column 2, lines 52+), and prevent wavefront distortion (column 2, lines59+).

With regards to the first manipulator, Fuchs only shows a schematic drawing of a fiber connected to the beamsplitter and does not expressly show how the fiber to beamsplitter connection is arranged.

Nicia et al show an optical branch coupler having fibers on rotatable manipulators (113, 115,) for optically connecting to a beamsplitter in order to provide a simple adjustment to adjust the optical connections. At the time of the invention, one of ordinary skill in the art would have used the two (113, 115 for **claim 8**) rotatable manipulator arrangement of Nicia et al in order to have a simple adjustment for adjusting the optical connection between the fiber and the beamsplitter.



With regards to **claim 9**, although Nicia et al do not expressly discuss that the first manipulator is adjustable to translate the first beam, one of ordinary skill in the art would be able

to observe that due to the pivot location of the rotatable walls, any adjustment made would translate the incident location of the first beam on the beam combiner thus meeting the limitation of claim 9.

With regards to **claim 31**, Takahashi shows a laser (17); and an optical element (18) in a path of the heterodyne beam between the laser and the beam splitter, wherein in the heterodyne beam exiting the optical element, the first frequency component has the first linear polarization and the second frequency component has the second linear polarization (column 6, lines 31-33).

With regards to **claim 32**, Takahashi shows that laser light is produced by a laser light source (17) and the acousto-optic device produces laser light of orthogonal two different frequencies. In column 3, lines 19+, Takahashi teaches that laser light of orthogonal two different frequencies can be produce by a laser influence by Zeeman effect or by means of an acousto-optical device, thus suggesting to one of ordinary skill in the art that both means are functional equivalents. Therefore one of ordinary skill in the art would have used a laser influenced by Zeeman effect since both are functional equivalent and in order simplify the apparatus will fewer component.

With regards to **claim 33**, Takahashi does not expressly teach what type of beamsplitter is used for beamsplitter 26a. Takahashi however specifies that "one of the laser lights is directed to a wavelength shifter (25) for shifting the wavelength of light" suggesting to the skilled artisan that only one wavelength is wavelength shifted, thus a beam of one frequency and polarization is directed to the wavelength shifter. The skilled artisan would recognize that a conventional amplitude dividing beamsplitter would not perform as required by Takahashi because each beam would be comprised of both frequencies and both polarizations which after one of the beams

going through the wavelength shifter, the result would be a beam of orthogonal four frequencies. Takahashi shows a polarizing beamsplitter (20) that separates an orthogonally polarized beam. At the time of the invention, one of ordinary skill in the art would have used a polarizing beamsplitter in order to separate the beam so that the combined beam from the wavelength shifter and the beam that bypassed the wavelength shifter results in an orthogonally polarized beam as required by Takahashi.

4. **Claim 30** *as understood by the examiner* is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi, Takamiya, Fuchs et al and Nicia et al as applied to claim 7 above, and further in view of Kawai et al (US 5,767,971).

Takahashi, Takamiya, Fuchs et al, and Nicia show all the elements as shown above with respect to claim 7, but do not show a motivation for a second AOM changing the frequency of the second beam.

Kawai et al show an interferometric displacement measuring apparatus where Kawai shows an embodiment where an AOM is used only on one path and a second embodiment where an AOM is used on each separate paths and teaches that both are functional equivalents (Figures 7 and 10).

At the time of the invention, one of ordinary skill in the art would have used a second AOM on the second beam because Kawai et al teaches that a single AOM on the first path is functionally equivalent to having an AOM on each beam, and the skilled artisan would recognize that having a second AOM on the second beam would give additional flexibility in selecting the frequency of the second beam.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Hwa S. Lee whose telephone number is 571-272-2419. The examiner can normally be reached on Tue-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley Jr. can be reached on 571-272-2800 ext 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Andrew Hwa S. Lee
Examiner
Art Unit 2877